In response to the objection to the Abstract, the Abstract has been replaced to correct the noted informalities. Accordingly, no further objection on that basis is anticipated.

New Claims 13-28 find clear support in the original specification, claims and drawings.[1] Hence, Claims 13-28 are not believed to raise a question of new matter.

Briefly recapitulating, Claim 1 is directed to a ceramic heater. For example, referring to the non-limiting embodiment of Fig. 1, a ceramic heater 10 includes a ceramic substrate 11 and a heating element 12 disposed either on the surface or internally of the substrate. The work-heating surface has a JIS B 0601 surface roughness of Rmax = 0.05 to 200 μm.

Due to this construction, the ceramic heater according to the present invention can heat a work such that the temperature of the work is to be uniform. This can be understood from the comparison of Examples and Comparative Examples. In Comparative Example 7, wherein Rmax is 210 μm, the temperature difference of the work, that is, the difference between the highest and the lowest temperature was as large as 8°C. In Comparative Example 6, Rmax is as small as 0.03 μm, but the difference between the highest and the lowest temperatures was also as big as 8°C. On the contrary, in the corresponding Examples, the temperature differences of the work were small. Namely, in Example 8 (Rmax = 0.08μm), the difference was 4°C; in Example 9 (Rmax = 6μm), it was 3°C; and in Example 10 (Rmax = 180μm), it was 4°C.

The temperature difference is supposedly generated as the following. When the surface roughness of the heating surface is small, the area of contact between the work and the ceramic substrate is large. Therefore, the temperature difference of the ceramic substrate

[1]For example, Claims 13-16 find support at page 6, lines 16-18 and page 7, lines 10-15 in the present specification; Claims 17-20 find support at page 12, lines 2-5 in the present specification; Claims 21-24 find support at page 13, lines 32-33 in the present specification; Claims 25 and 26 find support at page 10, line 28 in the present specification; and Claims 27 and 28 find support at page 6, lines 16-18 in the present specification.

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in the heater is reflected to the work as it is, and the temperature difference becomes large. Even in the mode of heating the work held apart from the ceramic substrate, the atmospheric gases (for example, air, reactive gas and the like) between the work and the ceramic substrate flow easily and deprive the work of heat, so that the temperature difference is generated.

When the surface roughness of the heating surface is large, atmospheric gases remain at the space among the irregularities of the surface or the space between the work and the ceramic substrate. This causes accumulation of heat leading to a large temperature difference of the work.

The Office Action asserts that Kobayashi (col. 4, lines 40-45) anticipates the present invention recited in Claim 1. However, Kobayashi does not disclose that the work-heating surface has a JIS B 0601 surface roughness of *Rmax* = 0.05 to 200 μm. Instead, Kobayashi discloses that the *average surface roughness (Ra)* of the *machined surface* may preferably be not more than 0.1 μm (col.4, line 20 and lines 34-35). The surface roughness Ra disclosed in Kobayashi is entirely different from the surface roughness Rmax recited in Claim 1.

Referring to the attached Fig. A, Ra is a value obtained by integrating the absolute value of a sectional curve of a rough surface and then dividing the resultant value by a measured length. The integrated absolute value of a sectional curve of a rough face f(x) corresponds to the area of shaded portions. Dividing this value with the length L gives Ra. Accordingly, Ra shows the level of the surface when a rough surface is smoothed, and indicates an average value of the heights of the irregularities. On the other hand, Rmax means a height difference between the highest position (mountain) and the lower position (valley). Ra and Rmax have no correlation.

Therefore, although Kobayashi discloses certain values of *Ra*, Kobayashi does not disclose or even suggest to limit the surface roughness Rmax value to 0.05 to 200 μm.

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Furthermore, Kobayashi relates to a process for bonding ceramic bodies. Namely, Kobayashi does not disclose that the surface roughness of the work-heating surface. Instead, Kobayashi discloses the optimum range of the surface roughness of the surface to be contacted, which is different from the work-heating surface recited in Claim 1.

Accordingly, Kobayashi is not believed in any way to anticipate the specific features recited in Claim 1. Therefore, Claim 1 is believed to be allowable.

Substantially the same arguments as set forth above with regard to Claim 1 also apply to dependent Claims 3, 13, 17, 21, 25 and 27, which depend directly from Claim 1. Accordingly, each of the dependent claims is also believed to be allowable.

Claim 2, 4 and 5 are directed to a ceramic heater. For example, referring to the non-limiting embodiment of Fig. 1, a ceramic heater 10 includes a ceramic substrate 11 and a heating element 12 disposed either on the surface or internally of the substrate. The ceramic substrate contains an element other than its dominant constituent elements and the work-heating surface of the heater has a JIS B 0601 surface roughness of Rmax = 0.2 to 200 μm.

Okuda et al. disclose a ceramic heater including a ceramic sintered body and a heating resistor. Okuda et al. disclose that the entire shape of the ceramic heater is cylindrical (col. 6, lines 39-40). Therefore, the ceramic heater of a flat plate form disclosed by the present invention is different in shape from the ceramic heater disclosed by Okuda et al. Okuda et al. disclose the surface roughness of the side surface including at least the maximum heating zone (20) of the cylindrical ceramic heater (col. 33, lines 19-21). Thus, Okuda et al. do not teach the surface roughness of a flat heating surface as the present invention does.

Okuda et al. do not suggest the fact that the surface roughness of a flat heating surface affects the temperature uniformity of the work.

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In the first place, the maximum heating zone (20) is spherical. Regardless of the surface roughness, it is impossible to heat a flat work uniformly by such a spherical heating zone, since the distance between the ceramic body and the work varies (see the attached Fig. B).

Moreover, the ceramic heater disclosed in the Okuda et al. reference is used for a glow plug (col. 1, lines 6-8). Therefore, in the Okuda et al. ceramic heater, uniform heating is not necessary. Accordingly, no one of ordinary skill in the art would find from Okuda et al. the fact that the surface roughness of a flat heating surface affects the temperature uniformity of the work. Therefore, Okuda et al. are not believed in any way to anticipate the specific features recited in Claims 2, 4 and 5. Therefore, Claims 2, 4 and 5 are believed to be allowable.

Substantially the same arguments as set forth above with regard to Claims 2, 4 and 5 also apply to dependent Claims 9, 14, 18, 22, 26 and 28, which depend directly from Claim 2; dependent Claims 6-8, 15, 19 and 23, which depend directly from Claim 4; and dependent Claims 10-12, 16, 20 and 24, which depend directly from Claim 5. Accordingly, each of the dependent claims is also believed to be allowable.

Please note that international preliminary examination concludes that Claims in the corresponding PCT application have novelty and inventive steps.

Consequently, in view of the present amendment, it is respectfully submitted that this application is in condition for allowance and an early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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IN THE CLAIMS

Please add new Claims 13 - 28 as follows:

--13. - 28. (New)--

IN THE ABSTRACT

Please delete the Abstract in its entirety and replace as follows:

--[The present invention has its object to provide a ceramic heater which has a high thermal conductivity so that the surface temperature of the heater plate promptly follows the temperature change of the heating element to control the temperature of the water-heating surface with high efficiency and the thermal diffusion of impurity from the ceramic heater can be successfully prevented.

This invention provides a ceramic heater comprising a nitride ceramic substrate and a heating element either on the surface or internally of said substrate.

wherein said nitride ceramic board contains an element other than constituent elements of nitride ceramics and a work-heating surface has the JIS B 0601 surface roughness of Rmax = 0.2 to 200 μm.]

A ceramic heater includes a ceramic substrate and a heating element which is disposed either on the surface or internally of the substrate. A work-heating surface has a surface roughness of Rmax = 0.05 to 200 μm.

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